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21. ~~The abrasive surface cleaning process of claim 20, wherein said steps of directing and impacting are performed automatically.~~

22. ~~The abrasive surface cleaning process of claim 20, wherein said steps of directing and impacting are performed manually.~~

23. <sup>15</sup> The in-situ abrasive surface cleaning process of claim <sup>1</sup>6, wherein the abrasive surface includes a front side and a backside and wherein said impacting includes supporting the backside while impacting a corresponding front side with dry ice particles.

24. ~~The in-situ abrasive surface cleaning process of claim 6, wherein said steps of directing and impacting are performed manually.~~

#### REMARKS

Applicant appreciates the Examiner's thorough examination of the subject application and requests reconsideration of the subject application based on the foregoing amendments and the following remarks.

Claims 1-5 are pending in the subject application. Claims 1-5 stand rejected under 35 U.S.C. 103 and/or 35 U.S.C. 112, second paragraph.

Claims 1-5 were canceled in the instant amendment without prejudice to prosecuting them in a continuing application. Added claims 6-23 were written to address the Examiner's non-art rejections and to more distinctly claim embodiments

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of Applicant's invention. The amendments to the claims are supported by the originally filed disclosure including the originally filed claims.

The specification was objected to because of its arrangement and for other enumerated reasons and correction was required. The drawing figures also appear to be objected to as not being in the proper arrangement/ form for a patent application. The specification and drawing figures are being amended herein to address the Examiner's objections and/or rejections. The amendments to the specification and drawing do not introduce new matter because they either are editorial in nature or are supported by the originally filed disclosure as hereinafter discussed.

35 U.S.C. 112, SECOND PARAGRAPH REJECTIONS

Claims 1-5 stand rejected under 35 U.S.C. 112 on the grounds that there are antecedent basis, indefiniteness and/or vagueness concerns with the identified claims.

As provided above, claims 1-5 were canceled in the foregoing amendment, as such this rejection of the claims is essentially mooted. However, Applicant notes that added claims 6-23 were written giving consideration to the concerns raised by the Examiner. As such Applicant believes that the areas of rejection have been identified and addressed in the foregoing amendment.

Accordingly, it is respectfully submitted that new claims 6-23 satisfy the requirements of 35 U.S.C. 112 and, as such, are in a condition for allowance.

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35 U.S.C. 103 REJECTIONS

Claims 1-5 stand rejected under 35 U.S.C. 103 as being unpatentable over either Parsons [USP 3,812,622] or Kataoka et al. [USP 5,168,671; "Kataoka"] and both in view of Palmer, Jr. (USP 5,525,093; "Palmer"). Applicant respectfully traverses as discussed below. Because claims 1-5 were canceled in the foregoing amendment and essentially replaced by claims 6-23, the following discussion refers to both the number and the language of the added claims. However, only those amended features specifically relied upon to distinguish the claimed invention from the cited prior art shall be considered as being made to overcome the cited reference(s). The following separately addresses the rejection of the claims provided in the above-referenced Office Action for each of the cited references.

**PARSONS & PALMER**

Claims 1-5 stand rejected as being unpatentable over Parsons in view of Palmer for the reasons provided on page(s) 6-7 of the above referenced Office Action.

As grounds for the rejection, the above-referenced Office Action provides that Parsons discloses a process for in-situ cleaning of a grinding surface by blasting the grinding surface with an abrasive. It also is provided that Parsons does not disclose using dry ice as an abrasive for cleaning a surface. It is further provided that Palmer discloses that it is well known in the art to use dry ice for cleaning a surface by spraying the dry ice against the surface. It is thus concluded that one skilled in the art would have modified the method of Parsons as taught by Palmer by using dry ice

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as the abrasive for in-situ cleaning of the grinding surfaces. Applicant respectfully traverses.

Applicant claims, claim 6, a process or method for cleaning one of an abrasive sanding, planing and grinding surface, hereinafter the abrasive surface. The in-situ abrasive surface cleaning process comprises the steps of directing dry ice particles towards the abrasive surface; and impacting the abrasive surface with the dry ice particles so as to remove material generated during an operational procedure and being retained in the abrasive surface and so as to not materially effect the abrasive surface. Such a process advantageously and effectively cleans the abrasive surface of the material that has loaded up the abrasive surface, which material prior art techniques fail to remove.

Additionally, and importantly, such a process effectively cleans the abrasive surface for re-use without impairing or materially effecting the abrasive surface even though the surface is being impacted by the dry ice particles. For example when the dry ice impacts and cleans the abrasive surface of a sanding belt, the abrasive properties of the sanding belt are not materially altered. In other words a 180 grit sanding belt would still be a 180 grit belt after is cleaned in accordance with the cleaning method of the present invention.

In contrast to that claimed by Applicant, Parsons discloses the well known technique of spraying a high velocity jet of a liquid solvent 33 from a nozzle 32 onto the surface of a sanding belt 20. It is also described therein that the liquid jet is applied onto a portion of the belt that is in advance the air nozzle 30, which air nozzle directs a high velocity jet of air onto the freshly wetted portion of the belt to blow the

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solvent and dissolved gum and loosened debris off the belt and into the air stream flowing to the exhaust port. See col. 2, lines 30-42 of Parsons. It is further described that the solvent is a low flash point solvent suitable for the gum or pitch or other materials adhering to the belt, for example tetrachloroethylene.

As such, and contrary to that suggested in the Office Action Parsons does not disclose a method in which a grinding surface is being blasted by an abrasive.

There also is no discussion or disclosure in Palmer that would overcome the foregoing lack of teachings in Parsons. Palmer also does not suggest that the system in Parsons could be completely redesigned including the elimination of essential features and steps so as to yield the methodology claimed by Applicant. Applicant respectfully submits that absent the teachings of the present invention, there is no motivation, suggestion or teaching offered in either Parsons or Palmer to produce the method claimed by Applicant.

Applicant also would note that the system and method disclosed in Parsons can easily cause problems with finishing and surface treatment of wood products because the system is solvent or liquid based. That system and method creates the potential for liquid contamination as well as humidity issues while processing the wood, notwithstanding the alleged use for cleaning sanding belts. Additionally, such a methodology raises issues and concerns with handling and disposing of waste products which include the solvent.

It is respectfully submitted therefore that claims 6-23 are patentable over the cited reference for the foregoing reasons.

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**KATAOKA & PALMER**

Claims 1-5 stand rejected as being unpatentable over Kataoka in view of Palmer for the reasons provided on page(s) 6-7 of the above referenced Office Action.

As grounds for the rejection, the above-referenced Office Action provides that Kataoka discloses a process for in-situ cleaning of a grinding surface by blasting the grinding surface with an abrasive. It also is provided that Kataoka does not disclose using dry ice as an abrasive for cleaning a surface. It is further provided that Palmer discloses that it is well known in the art to use dry ice for cleaning a surface by spraying the dry ice against the surface. It is thus concluded that one skilled in the art would have modified the method of Kataoka as taught by Palmer by using dry ice as the abrasive for in-situ cleaning of the grinding surfaces. Applicant respectfully traverses.

Applicant claims, claim 6, a process or method for cleaning one of an abrasive sanding, planing and grinding surface, hereinafter the abrasive surface. The in-situ abrasive surface cleaning process comprises the steps of directing dry ice particles towards the abrasive surface; and impacting the abrasive surface with the dry ice particles so as to remove material generated during an operational procedure and being retained in the abrasive surface and so as to not materially effect the abrasive surface. Such a process advantageously and effectively cleans the abrasive surface of the material that has loaded up the abrasive surface, that prior art techniques fail to remove.

Additionally, and importantly, such a process effectively cleans the abrasive surface for re-use without impairing or materially effecting the abrasive surface even

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though the surface is being impacted by dry ice particles. For example when the dry ice impacts and cleans the abrasive surface of a sanding belt, the abrasive properties of the sanding belt are not materially altered. In other words a 180 grit sanding belt would still be a 180 grit belt after it has been cleaned using the above claimed method.

In contrast to the method claimed by Applicant. Kataoka describes a system in which a slurry having a maximum volume ratio of abrasive particles to liquid of about 1 to 9, or 10% solid particles in the total volume is used as a cleaning fluid for a grinding wheel. This slurry is ejected under pressure from a nozzle 5 so the abrasive particles hit the stock removed by the grinding wheel and stuck between abrasive grains of the wheel. The ejected liquid also forms a mist, which mist impinges upon the wheel to wash off the removed stock. It also is provided therein that it is not desirable to increase the maximum volume ratio of abrasive particles above the 10% limit because the particles are not accelerated singularly but rather are blasted as cohering groups of particles.

Additionally, in the discussion of the prior art in Kataoka, one of the techniques described therein is blasting abrasive particles such as alumina from a blasting gun by a highly pressurized air stream. It is further provided that if the air pressure is too high the impact force of the blasted dry abrasive particles causes the usable grains on the wheel to drop off (i.e., damaging the wheel) and if the pressure is too weak then dressing is not enough. It also points out that the reclamation of the blasted abrasive particles and air circulation for re-use is difficult.

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It also is well known to those skilled in the art that blasting a sanding belt with an abrasive material alters the abrasive qualities of the belt. For example, if a 180 grit sanding belt is cleaned using glass beads then the cleaned belt is no longer a 180 grit belt but a belt having a finer grit characteristic such as 220 grit. Thus, the cleaning process alters the sanding characteristic of the belt and the quality of surface finishing and production rate of the cleaned belt. Practically speaking, one also would not consider cleaning a sanding belt in-situ or while in operation because of the potential for damage to the operation of the sanding apparatus by the abrasive particles as well as the potential for damage to any product being processed through the apparatus.

Thus, Kataoka does not disclose blasting a surface with abrasive particles, rather Kataoka teaches a method for cleaning using a liquid slurry containing abrasive particles not to exceed a maximum volume of 10% that is ejected from a nozzle so both the particles and the liquid mist impinge upon the grinding wheel. It is clear, that in the method of the present invention a liquid is not being ejected along with the dry ice at the abrasive surface to be cleaned.

Kataoka also teaches that blasting dry abrasive particles as a practical matter either causes damage to the grinding wheel or is in-effective to clean the surface. In sum, Kataoka teaches away from blasting a surface with dry abrasive particles.

Palmer is merely being relied upon for the teaching of the use of dry ice as an abrasive to clean a surface. Palmer also merely teaches using dry ice abrasive particles in applications where fine abrasive grits or particles of sand are propelled by a jet of high pressure air against the surface to be cleaned. Nowhere does it suggest

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that dry ice particles can be used to clean an abrasive surface without materially effecting the operational characteristics (e.g., abrasiveness) of the surface to be cleaned. Nor does Palmer suggest or disclose the problems being overcome by means of the method according to the present invention.

Assuming, arguendo, that Kataoka and Palmer teach what is suggested in the Office Action, Applicant asserts that the 35 U.S.C. § 103 rejection of the claims is still improper because the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F. 2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). In order to make out a prima facie case of obviousness, there must exist in the cited references some suggestion or teaching to combine the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat App. & Inter. 1993). Moreover, the references must contain an indication that the resultant combination will be reasonably successful.

Neither Kataoka nor Palmer teach or suggest the method claimed by Applicants, nor do they teach combining the references so as to yield the invention claimed by Applicant nor do they include any indication that any resultant combination would be reasonable successful.

It is respectfully submitted that claims 6-23 are patentable over the cited reference for the foregoing reasons.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

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references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching, suggestion or motivation.

Furthermore, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in the reference or the admitted prior art. Also, it is clear from the foregoing discussion that the modification suggested by the Examiner would change the principle of operation of the device disclosed in the reference.

The Federal Circuit also has indicated that a prior art reference that gives only general guidance and is not all that specific as to particular forms of a claimed invention and how to achieve it, may make a certain approach obvious to try, but does not make the invention obvious. *Ex Parte Obukowicz*, 27 USPQ2d 1063, citing *In re O'Farrell*, 853 F. 2d 894, 7 USPQ2d 1673,1681 (Fed. Cir. 1988).

It is respectfully submitted that for the foregoing reasons, claim(s) 6-23 are patentable over the cited reference(s) and satisfy the requirements of 35 U.S.C. 103. As such, these claims, including the claims dependent therefrom are allowable.

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SEPCIFICATION OBJECTIONS

The Examiner objected to the specification of the subject application and requested correction thereof. In accordance with the discussion with the Examiner regarding the objection to the application, Applicant is canceling each page of the specification, including the Abstract and the claims, and enclosing herewith replacement pages for each of the canceled pages.

As also discussed with the Examiner, Applicant need not provide a marked-up copy of the substitute specification showing the matter being added and deleted from the specification of record. Instead the Examiner had requested Applicant to provide a description of the amendments/ revisions being made to each section of the specification.

In accordance with 3C.F.R. § 1.125(b)(2) the undersigned hereby represents and states that the substitute specification provided on the enclosed replacement pages includes **no new matter**.

The following identifies and describes the changes, if any, to each section of the specification that are not corrections of typographical, punctuation and/or spelling errors. Please note that the following refers to the section of the specification provided on the enclosed replacement pages.

TITLE

The TITLE was amended in the foregoing amendment so as to be generally descriptive of the invention being claimed by Applicants.

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### FIELD OF INVENTION

The Field of Invention was edited for grammatical and editorial purposes. Additionally, and for consistency with the invention of the originally filed claims, the discussion also provides that the present invention relates to methods and systems for in-situ cleaning, whereas it had previously had only indicated a relation to systems.

### BACKGROUND OF THE INVENTION

The Background was edited for clarity and for grammatical and editorial reasons. Additionally, a long single paragraph in the background was edited for clarity so the discussion appears in a number of shorter paragraphs.

### DEFINITIONS

A Definitions section was added for clarity and to include in a central location a definition of what the term dry ice shall be understood to mean. This definition is consistent with the originally filed application including the originally filed claims. See for example the field of invention, summary of invention and claim 1 of the originally filed application. This also was done so the objectionable pharantetical expression in the claims could be easily removed to address a non-art based grounds for rejection provided by in the above-referenced Office Action..

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SUMMARY OF INVENTION

The Summary of Invention was revised so as to reflect the invention being claimed in the originally filed claims. Certain of the discussion in the Summary of the Invention as originally filed was relocated into the Description of the Preferred Embodiment because it appeared to be more a appropriate location.

BRIEF DESCRIPTION OF THE DRAWING

The Brief Description of the Drawing was amended/ changed as follows.

The drawing figures included on page 5 of the originally filed application were removed and as described below were put onto separate sheets.

As described below each of the drawing figures were re-numbered as FIGS. 1-3 and FIGS. 4A-C. As such, the Brief Description was revised to refer to the new drawing numbers and to provide a brief description of what each of the numbered views was showing. Support for the description of each view is found in the discussion on page 6 of the subject application, the originally filed claims and the drawing figures themselves.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In addition to the grammatical and editorial changes the Description of the Preferred Embodiment was revised as follows.

The Description was re-organized so as to be consistent with the re-ordering of the drawing figures, to eliminate alpha character reference numerals and use instead numeric reference numerals, to eliminate the reference numerals from features not

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specifically shown on the drawing figures and to add reference numerals to features shown on the drawing figures and described in the specification as originally filed. In addition, the discussion was edited for clarity of the description. In general the specification was revised to assure that the Description was consistent with that shown on the originally filed drawing figures, the Summary of Invention, as originally filed, and the originally filed claims.

As discussed below in connection with the amendment to the drawing figures, a box identified by reference numeral 140 was added to the drawing to schematically represent the vacuum device or apparatus discussed in the specification. In addition to including a reference numeral in the specification, the specification was revised to include the language of originally filed claim 2 that was not already contained therein.

For purposes of clarity, further explanation or description of what is shown in the drawing figures was added to the Description. Also descriptive information such as the loading up of the sanding belt, as described in the Background, was added to the Description to make the discussion therein more readable.

Terminology descriptive of the dry ice particles (e.g., high velocity) exiting the dispensing device or nozzle found elsewhere in the specification and the claims was added to the Description. Also added to the Description is a discussion regarding cleaning of the surface using a hand held device and one regarding one-axis and two axis control devices for the dispensing nozzle. The supporting disclosure is found for example in originally filed claim 5.

The discussion in the Summary of Invention, as originally filed, regarding the initial test results was added to the Description.

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If the Examiner has any questions regarding the support for any of the revised language of the Description of the replacement specification, then the Examiner is respectfully requested to contact the undersigned by calling collect for any such information.

### CLAIMS

As requested by the Examiner, the claims were not amended on the pages of the replacement specification. However, the re-pagination (e.g., double line spacing) and other amendments/ changes to the specification resulted in the claims physically appearing on different page numbers from that of the originally filed specification. As such and to avoid any later confusion as to page numbering, Applicant also has enclosed herewith pages 10 and 11 of the replacement specification on which is found the claims as originally filed. These pages replace page 7 of the originally filed application.

As also discussed with the Examiner, and to advance prosecution, Applicant also has canceled all of the pending claims in the foregoing amendment and has introduced new claims, claims 6-23 into the subject application. These new claims are fully supported by the originally filed disclosure including the originally filed claims and drawing figures.

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ABSTRACT

The Abstract was relocated within the specification so it is now the last page thereof. The Abstract also was changed for editorial and grammatical purposes and so as to be generally consistent with the claimed invention.

OTHER

In addition to the arrangement based objections to the specification, the Examiner provided specific objections to the specification because of the presence of reference numerals in the specification that are not shown on the drawing figures as provided on page 5 of the above-referenced Office Action.

In developing the text of the enclosed replacement specification, reference numerals were omitted from the replacement pages if not shown on the drawing figure. Applicant has, however, as discussed below amended the drawing figure to include one of the omitted items, which addition does not involve the introduction of new matter.

It is respectfully submitted that for the foregoing reasons, the specification satisfies applicable Patent laws and rules and, therefore is considered acceptable.

DRAWING OBJECTIONS

Although not specifically and explicitly stated, the drawing figures of the originally filed application appear to be objected to because of the discussion on pages 3-4 of the above-referenced Office Action regarding the "Content of Specification." Apparently the drawings are objectionable at least because they are

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included along with the text of the Brief Description of the Drawing instead of constituting separate pages of the subject application. Applicant has amended the enclosed figures of the Drawing as follows.

1. As indicated hereinabove, the specification was amended so the drawing figures now appear on separate sheets/ pages of the application.
2. The various views of the drawing were re-organized and also were re-numbered as FIGS. 1-3 and FIGS. 4A-C. Additionally, the figures were enlarged from that shown originally while copying the original figures using the copying process.
3. The alpha character reference numerals have been deleted and numeric reference numerals have been added to each of the figures. Reference numerals also were added to better relate that shown on the drawing with the discussion in the specification.
4. A schematic box identified by reference numeral was added to FIGS. 1-2 and reference numeral R is replaced by reference numeral 140 in the specification. Applicant offers the following as to why this amendment to FIGS. 1-2 and the related amendment to the specification **do not** involve entry of new matter.

As provided on page 6 of the originally filed application, the removed surface contaminants may be captured, contained and/or collected by means of a suction device or vacuum device or apparatus R. Claim 2 of the originally filed application further provides that a suction is applied to the dry ice particle application area during the cleaning process to capture, contain and/or collect the removed contaminants from the abrasive sanding, planing and/or grinding surface. It also is clear from the discussion and drawing figures of the originally filed application,

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including the Abstract and claims thereto, that the dry ice application area generally is where the dry ice particles would impact the surface to be cleaned.

Accordingly, the schematic box identified by reference numeral 140 in FIGS 1-2 representing the suction or vacuum device 140 in the specification is consistent with and supported by the originally filed disclosure.

Applicant would note that an annotated or marked up drawing figure in red to identify each of the changes enumerated above is not provided herewith based on the Examiner's comment not to create a mark-up of the specification to specifically identify changes.

In light of the foregoing the drawing, as amended, is considered acceptable.

#### OTHER MATTERS

The subject application was filed pro se by Applicant/ Inventor J. T. Armstrong. Subsequently, Applicant/ Inventor appointed the undersigned and others to prosecute the subject application and to transact all business in the U.S. Patent and Trademark Office connected therewith. Enclosed herewith please find a Power of Attorney, dated September 28, 1998, executed by Applicant and effecting the above-described appoint.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested.

Although claims were added to the subject application, Applicant believes that additional fees are not required. However, if for any reason a fee is required, a fee

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paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized  
and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

DIKE, BRONSTEIN, ROBERTS  
& CUSHMAN

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